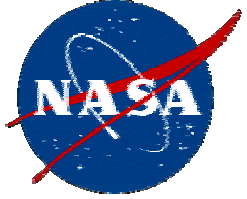

SAGE Temperature and Pressure Data Products: Validation and Trends

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Co-Investigators:

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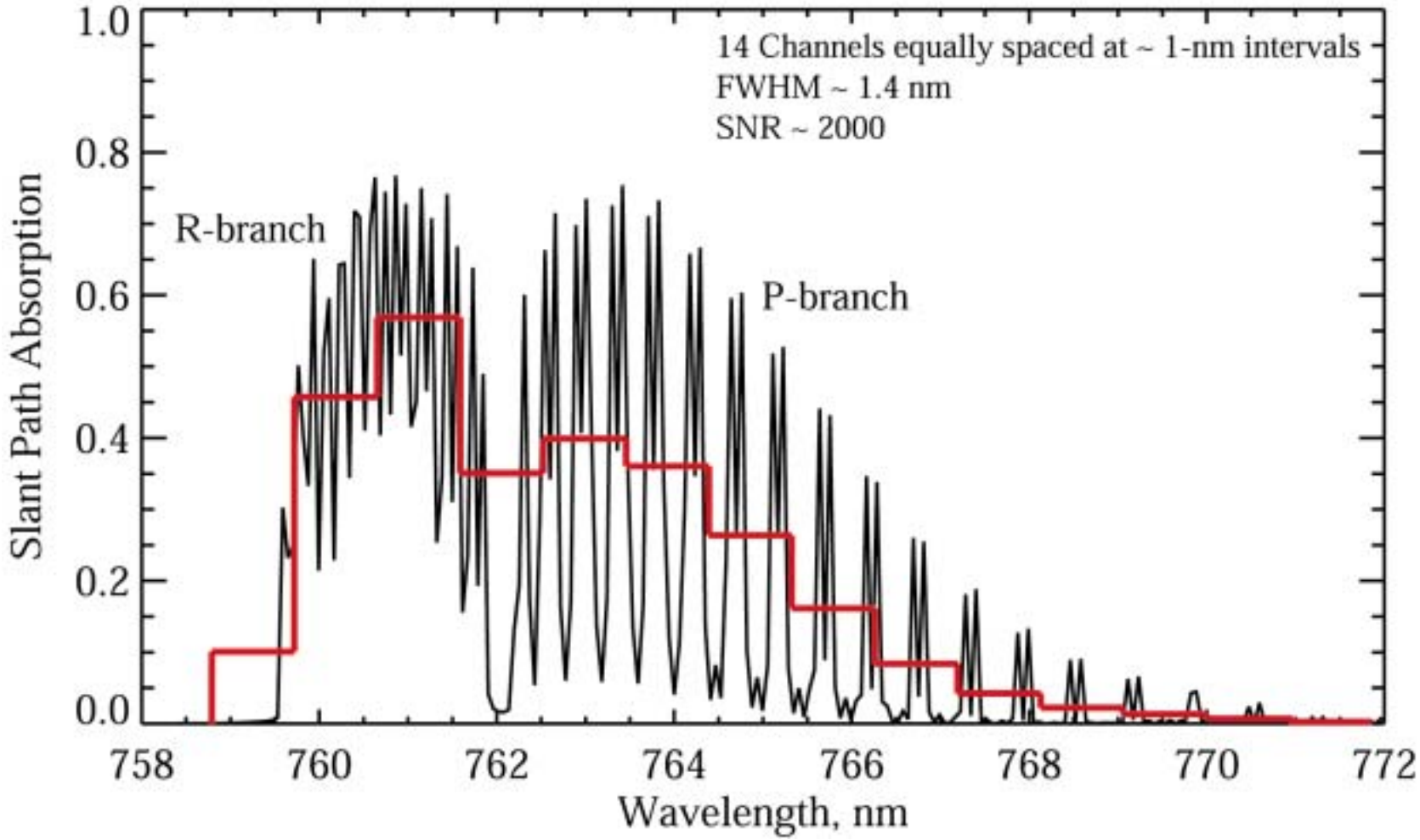
Outline

- SAGE III temperature and pressure data products
  - Retrieval status
  - Performance issues
  - Data comparisons
- Science Team Activities
  - SAGE III T/p validation
  - Trend analysis

SAGE III Oxygen A-Band Measurements



Strategy for T/p Retrievals

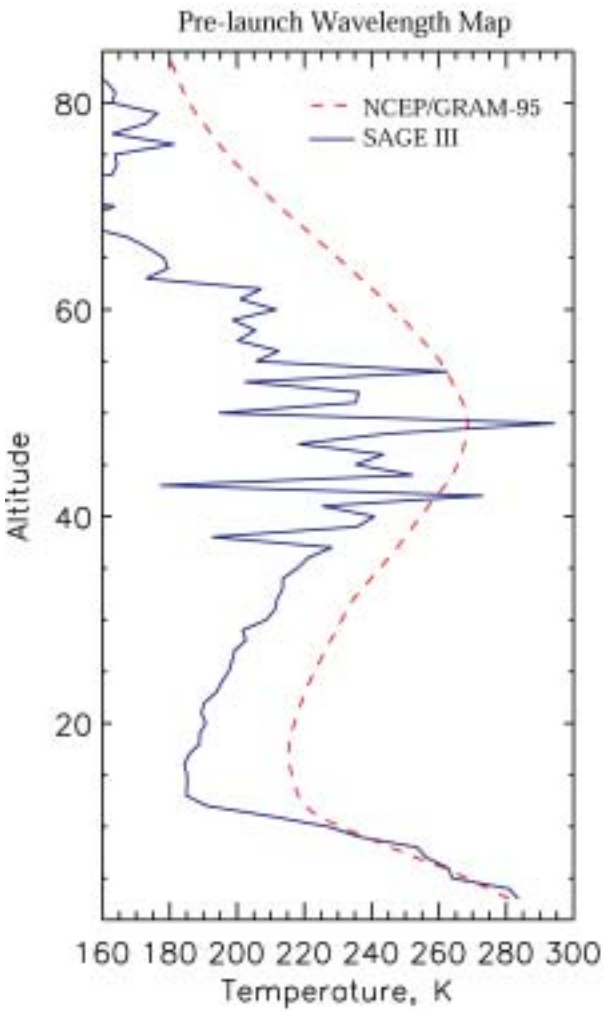
- Iterative approach required due to non-linear nature of problem
- Uses global fitting method
  - Simultaneously fits measured absorption spectra (O_2 + Rayleigh) from all 14 channels and 90 tangent altitudes
  - Interfering aerosol and ozone signals cleared prior to retrievals
  - Solves for successive adjustments to trial T,p profiles by minimizing residuals between measured and modeled absorptivities
  - T,p determined at 1-km intervals from 1-85 km
- Current operational algorithm uses Emissivity Growth Approximation (EGA) for forward model calculations
- Optional hydrostatic constraint

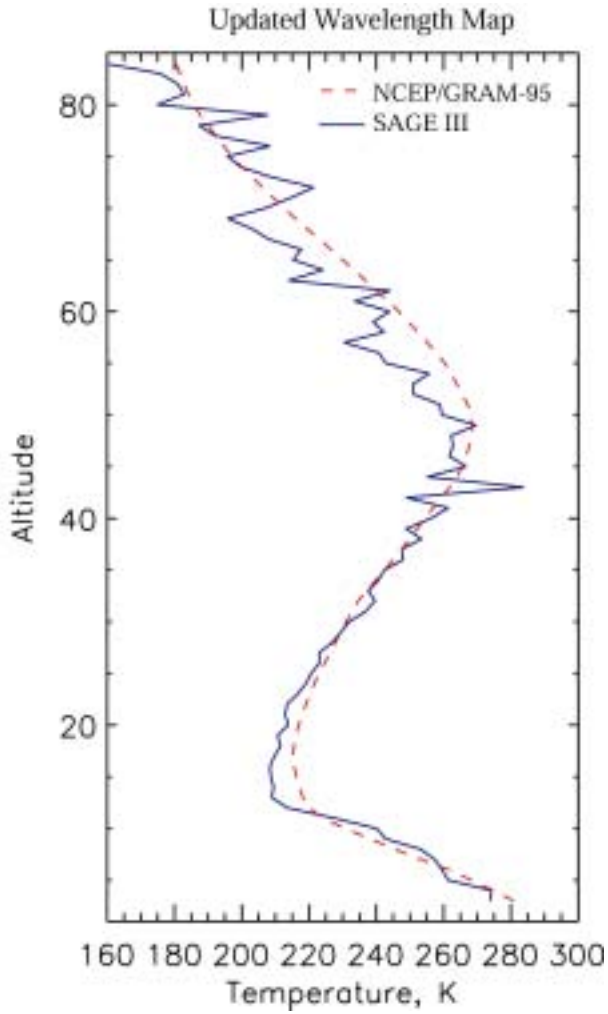
T/p Retrieval Status

- Preliminary assessment
  - Cold bias in troposphere and mesosphere
  - Noisy above ~ 50 km
- Known performance issues
  - Attenuator etaloning
  - Spectral calibration
  - Spectroscopy
- Research algorithm
  - Simultaneously solves for aerosol, ozone, temperature and pressure
  - Optional “fast” line-by-line forward model

Sensitivity to Spectral Calibration

(0.07-nm shift)





T/p Retrieval Status

- Preliminary assessment
  - Cold bias in troposphere and mesosphere
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  - Attenuator etaloning
  - Spectral calibration
  - Spectroscopy
- Research algorithm
  - Simultaneously solves for aerosol, ozone, temperature and pressure
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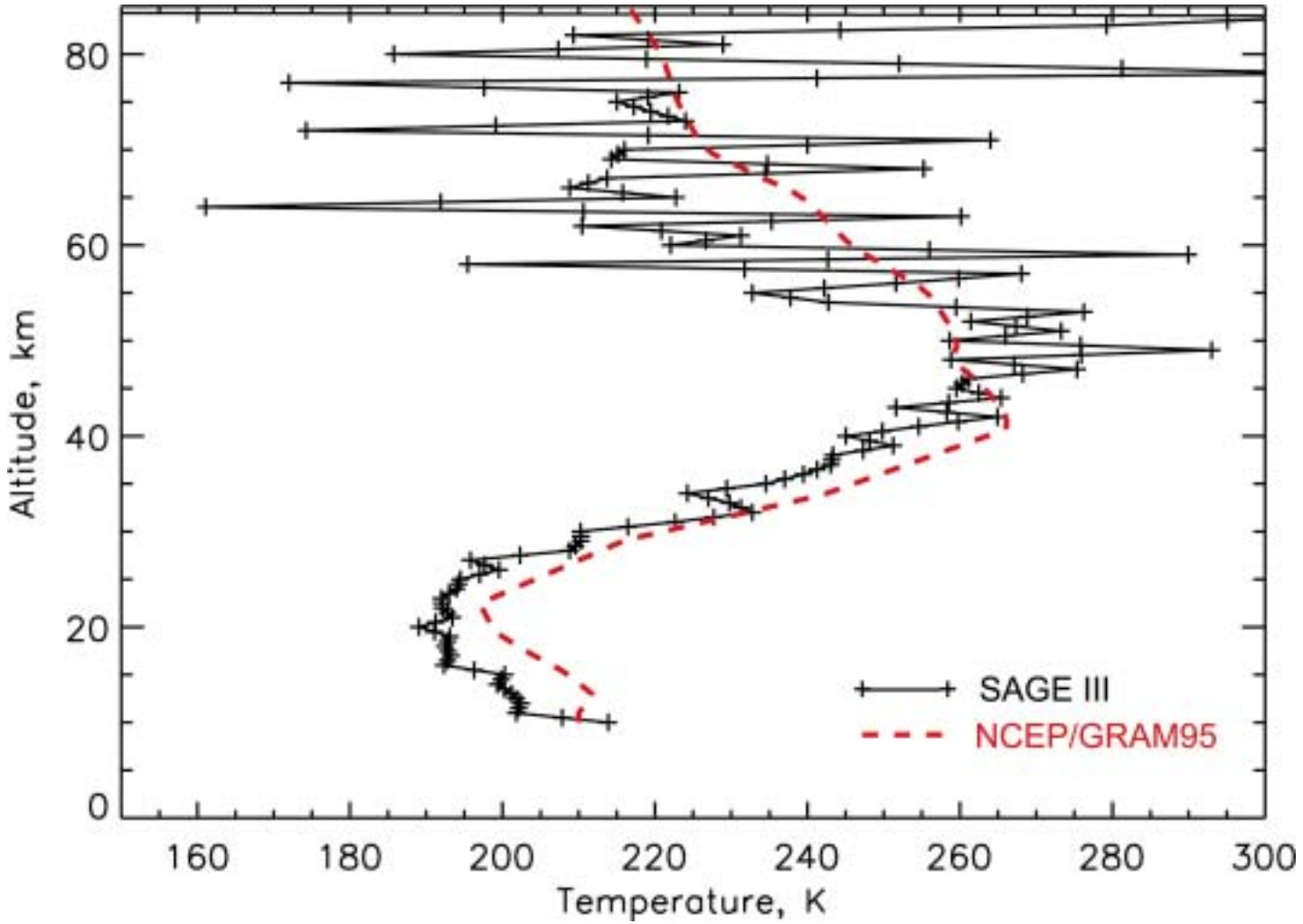
SAGE III Temperature Retrieval

Event 550820 with EGA Forward Model

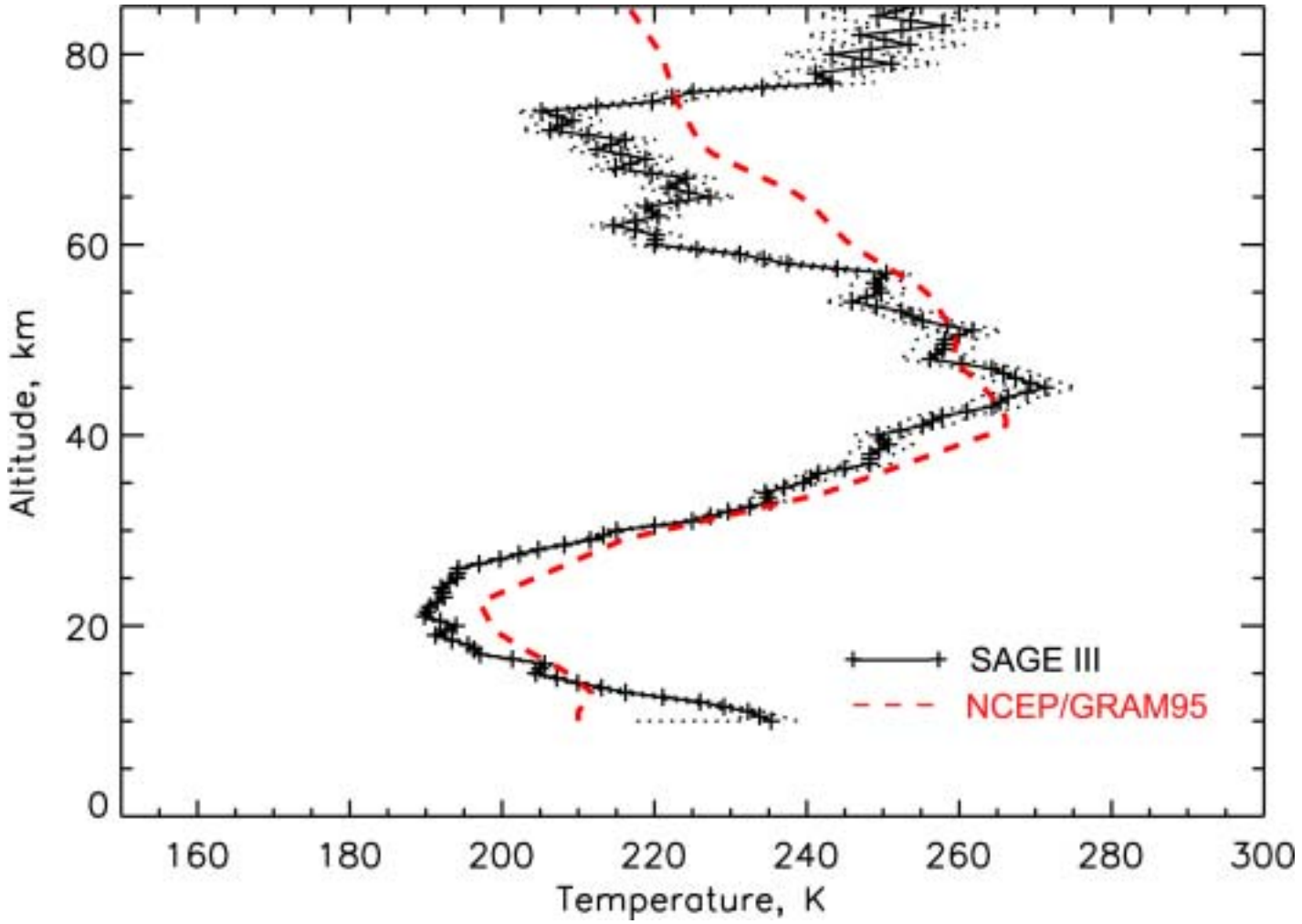
(Jan. 17, 2003 68.6 N, 11.2 E)



SAGE III Temperature Retrieval

Event 550820 with Hydrostatic Constraint

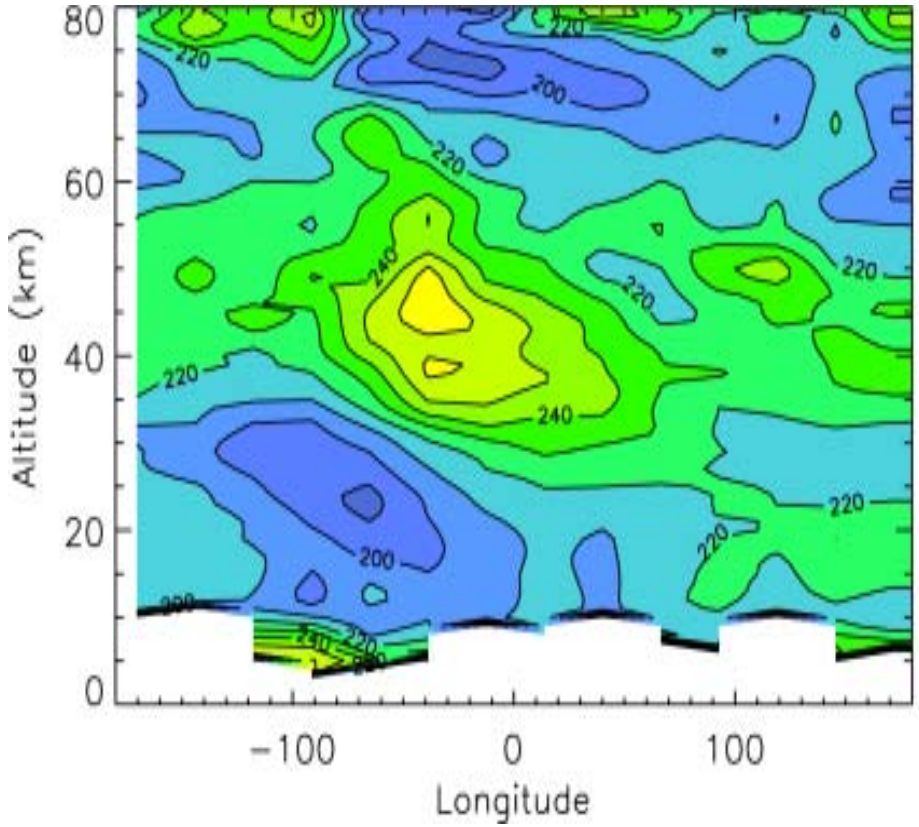
(Jan. 17, 2003 68.6 N, 11.2 E)



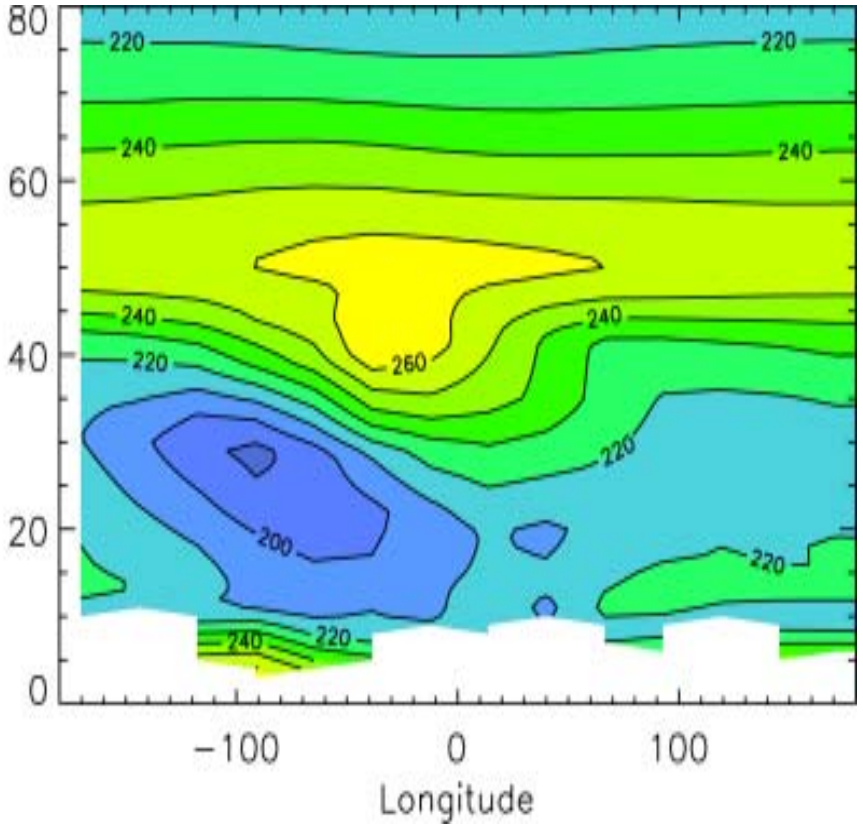
SAGE III Comparison with NCEP/GRAM95

July 7, 2002 Lat. = 56.7 S

SAGE III

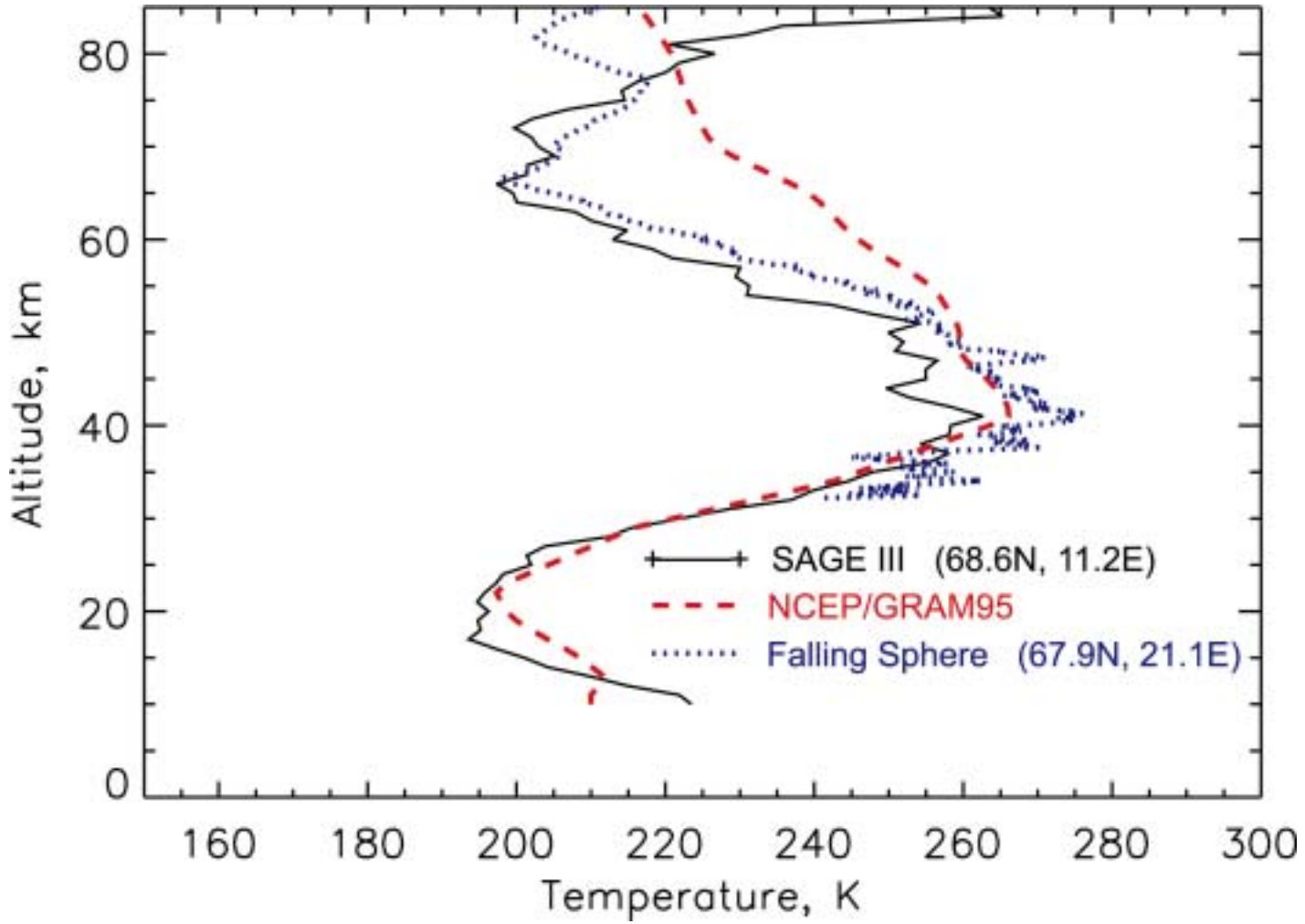


NCEP/GRAM95



SAGE III / Falling Sphere Comparison

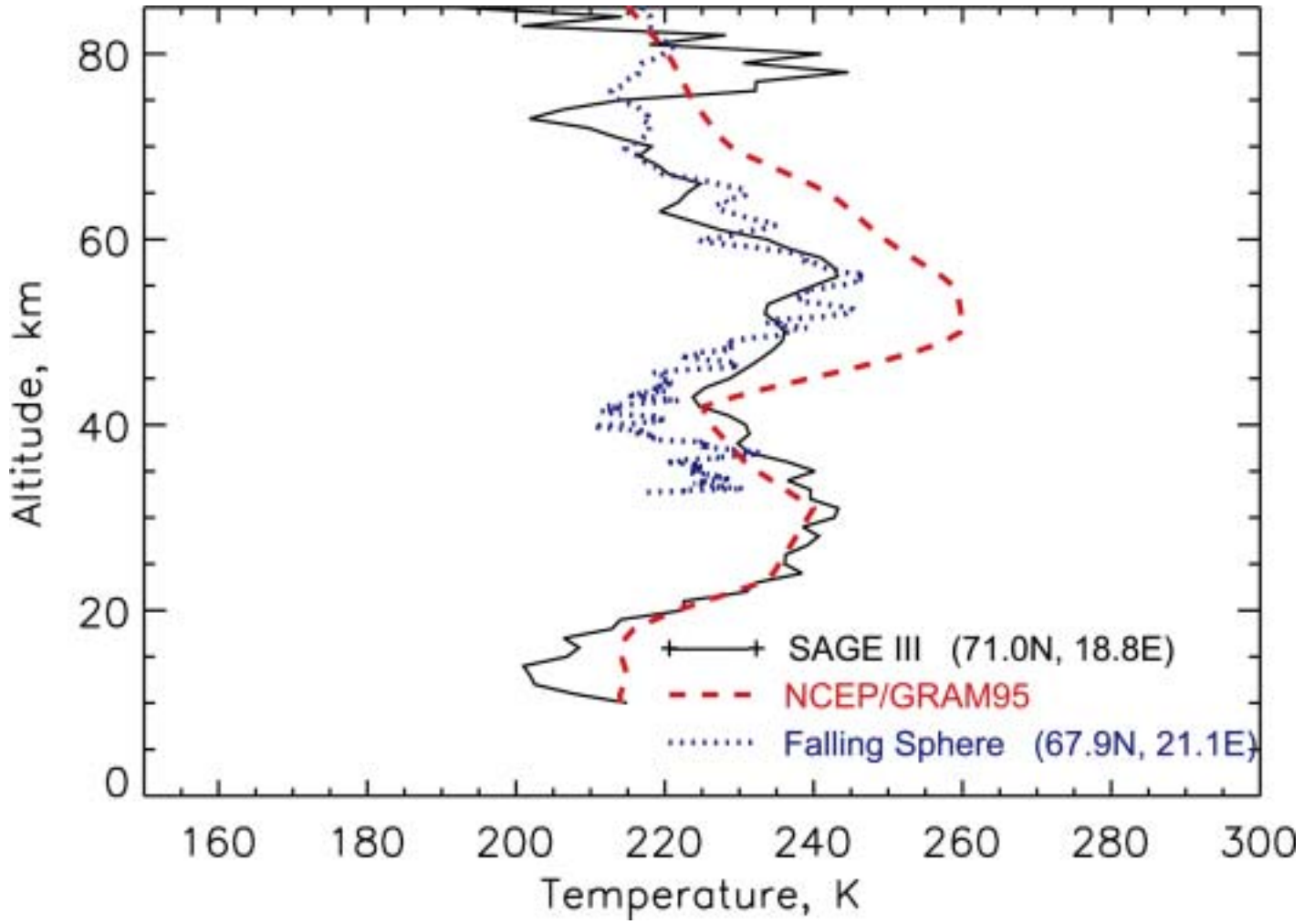
Event 550820 with Research Code



SAGE III / Falling Sphere Comparison

Event 563120 with Research Code

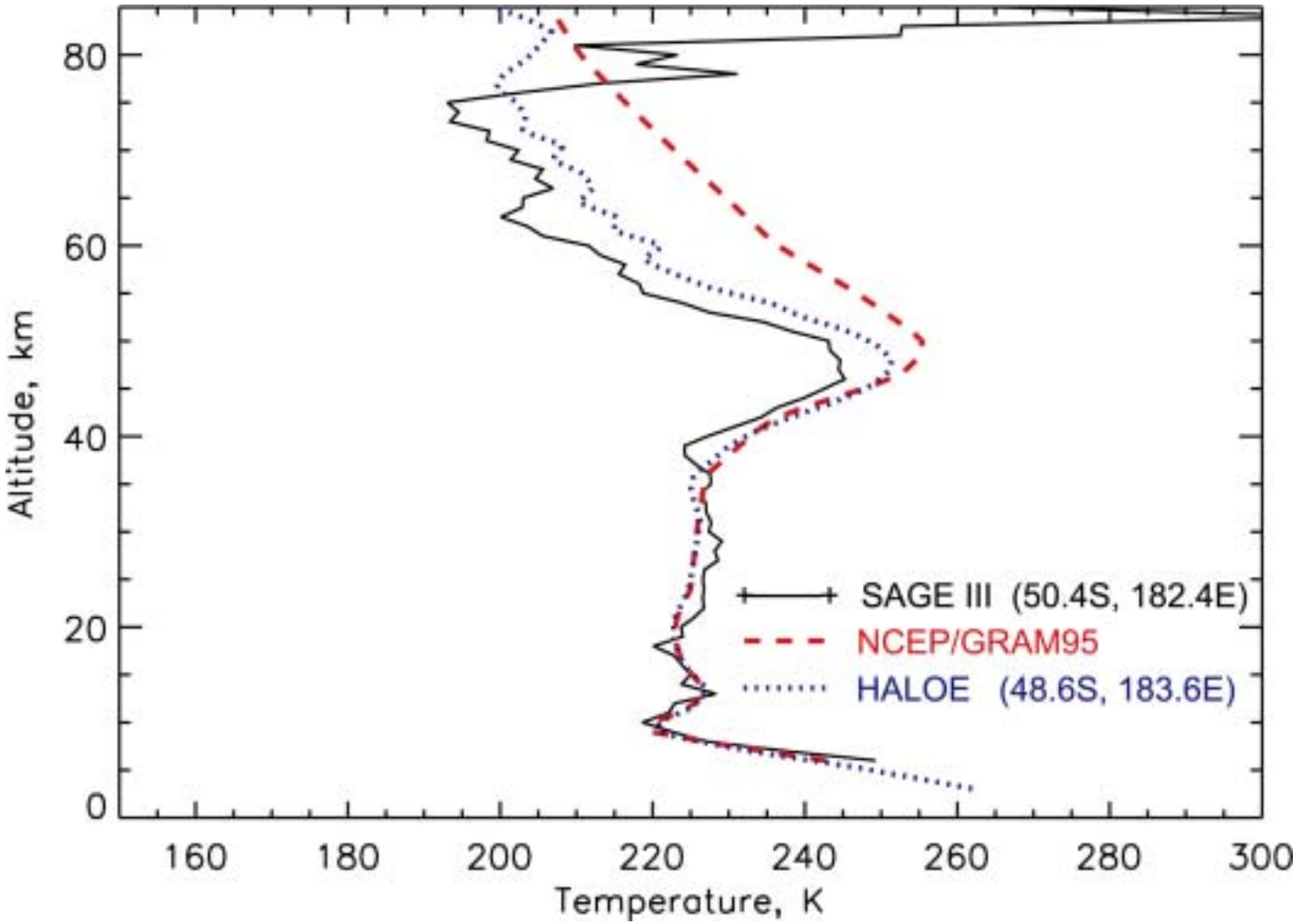
(Jan. 26, 2003 71.0 N, 18.8 E)



SAGE III / HALOE Comparison

Event 372710 with Research Code

(Sept. 9, 2002 50.4 S, 182.4 E)



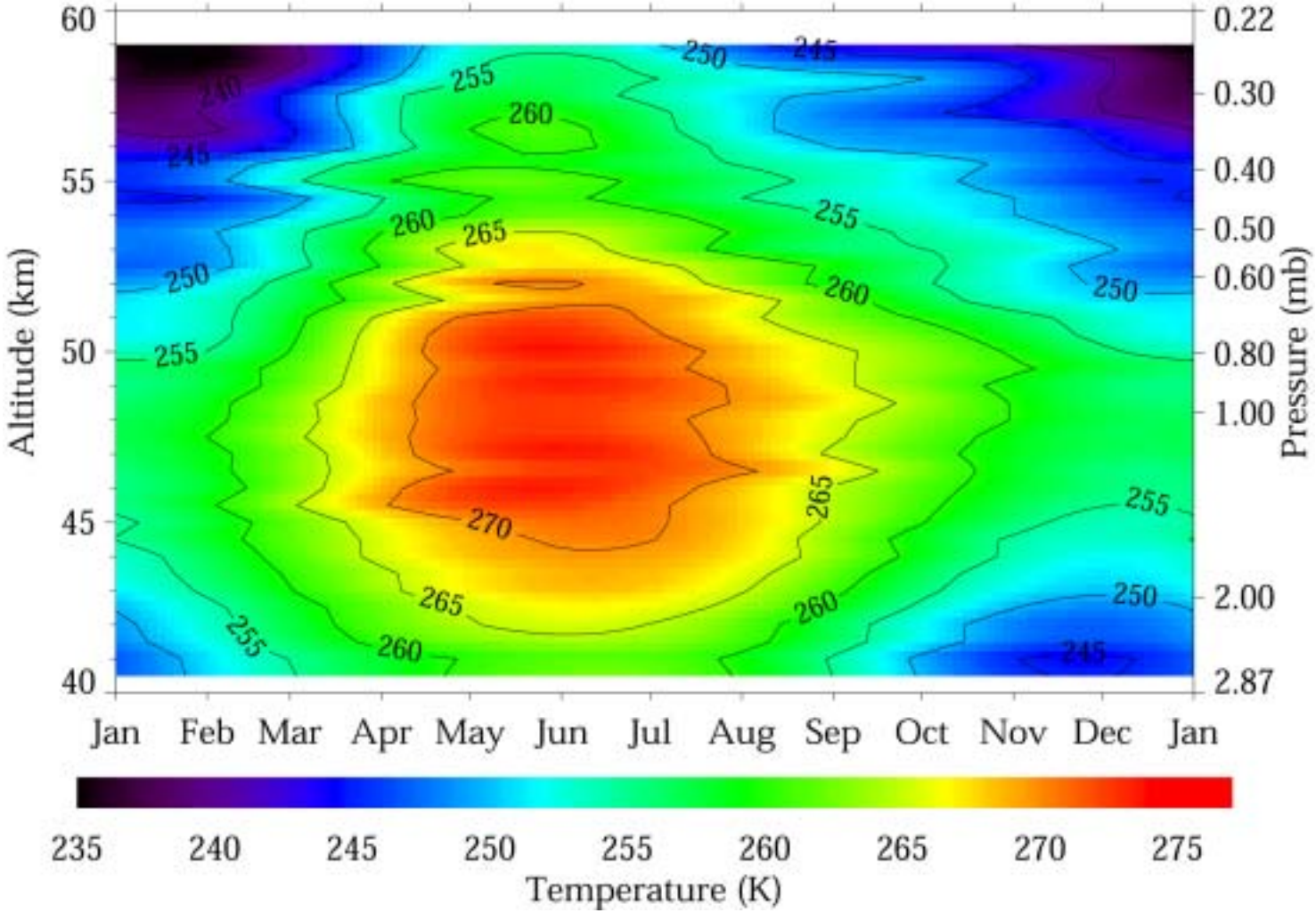
Science Team Activities

- Validation of SAGE III T/p data products through correlative comparisons
  - Radiosondes (z < 30 km)
  - Lidar, rocketsondes
  - Satellite (ILAS-II, HALOE, SABER, GOMOS, etc)
  - NCEP
- Trend analysis
  - SAGE II temperature determination
  - SAGE II density and temperature trend analysis

  (Burton and Thomason, *Molecular density retrieval and temperature climatology for 40-59 km from SAGE II*, submitted to JGR)
  - SAGE II and SAGE III intercomparisons

SAGE II Temperature Climatology

Latitude Band: 30 N – 50 N



SAGE II Temperature Climatology

Latitude Band: 10 S – 10 N